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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10:069,274	06/11/2002	Kaoru Mackawa	P 290685	1701

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EXAMINER

DOAN, THERESA T

ART UNIT

PAPER NUMBER

2814

DATE MAILED: 08/26/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/069,274	Applicant(s) MAEKAWA ET AL.	
	Examiner Theresa T Doan	Art Unit 2814	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 11 June 2002.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9 and 11-19 is/are rejected.
- 7) ☒ Claim(s) 10 and 20 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                     | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                            | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>0902</u> . | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-2, 4-5, 7-12, 14-15 and 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watatani (U.S. 6,153,511) in view of Jeng (U.S. 6,521,548).

Regarding claims 1, 4, 7, 11, 14 and 17, Watatani in figures 5A-5I a method of fabricating a semiconductor device, comprising the steps of:

forming a first organic SOG insulation film 74 on a substrate 70 by a spin-on process;

forming a second organic SOG insulation film 78 on the first insulation film 74 by a spin-on process (see figure 5A, column 5, lines 55-63 and column 6, lines 1-3);

patterning the second organic SOG insulation film 78 to form an opening 93 therein (see figures 5D-5E); and

etching the first insulation film 74 while using the second insulation film 78 as a mask (figures 5F-5G, column 7, lines 4-42).

Watatani does not teach a step of applying a curing process to the first insulation film at a temperature of 380 - 500°C over duration of 5 - 180 seconds. However, Jeng teaches a method of forming a spin-on dielectric film 36 using a curing process to the

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spin-on dielectric film 36 at a temperature between 400 and 450°C over a duration of 3-5 minutes (column 3, lines 24-35 and column 4, lines 1-20) in order to form the spin-on dielectric film quickly with and on-line method so as to shorten the time required by the curing process and thereby increase the throughput (column 2, lines 21-24). Given the above teaching, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to apply a curing process to the first insulation film 74 in Watatani's process as taught by Jeng in order to form the spin-on dielectric film quickly with and on-line method so as to shorten the time required by the curing process and thereby increase the throughput (column 2, lines 21-24).

Regarding claims 2, 5, 12 and 15, Watatani in figures 5A-5I wherein the first and second insulation films (74,78) comprises an organic material having a specific dielectric constant of 3.0 or less (column 8, lines 38-41).

Regarding claims 8-9 and 11-8-19, as discussed above, Watatani and Jeng do not teach the curing process is conducted at a temperature between 380 - 500°C over a duration of 10 - 150 seconds and a temperature between 400 - 470°C over a duration of 10 - 150 seconds. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to apply the curing process is conducted at a temperature between 380 - 500°C over a duration of 10 - 150 seconds and a temperature between 400 - 470°C over a duration of 10 - 150 seconds in Watatani and Jeng's device, since it has been held where the claimed ranges and prior art ranges do

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not overlap but are close enough that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corporation of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985).

3. Claims 3, 6, 13 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watatani (U.S. 6,153,511) in view of Jeng (U.S. 6,521,548) as applied to claims 1 and 11 above, and further in view of Sugahara et al. (U.S. 6,558,756).

Watatani and Jeng do not teach the first and second insulation film comprises an organic material of aromatic group. However, Sugahara et al. teach an insulating film comprises an organic material of aromatic group (column 10, lines 1-25) for resulting in improved film formability and lower cost (column 10, lines 21-22). Given the above teaching, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to use the first and second insulation film comprises an organic material of aromatic group in Watatani and Jeng's device as taught by Sugahara in order to improve film formability and lower cost (column 10, lines 21-22).

#### ***Allowable Subject Matter***

4. Claims 10 and 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The prior art of record fails to disclose all the combination of the semiconductor device structure as claimed, including a step of curing process is conducted such that there is formed an intermixing layer between said first and second insulation films.


### **Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Theresa T Doan whose telephone number is (703) 305-2366. The examiner can normally be reached on Monday to Thursday from 8:00AM - 6:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, WAEL FAHMY can be reached on (703) 308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

TD  
August 25, 2003

  
PHAT X. CAO  
PRIMARY EXAMINER